

### Perhitungan Fraksi Volume

Untuk perhitungan fraksi volume serat 10% dapat dilihat sebagai berikut :

Diketahui :

$$\text{Massa jenis serat batang pisang } (\rho_f) = 0,612 \text{ gr/cm}^3$$

$$\text{Massa jenis resin } (\rho_m) = 1,13 \text{ gr/cm}^3$$

$$\text{Dimensi cetakan} \quad \text{Panjang } (p) = 8 \text{ cm}$$

$$\text{Lebar } (l) = 6,5 \text{ cm}$$

$$\text{Tinggi } (t) = 0,5 \text{ cm}$$

$$\text{Volume cetakan } (v_c) = 26 \text{ cm}^3$$

5. Volume matrik ( $v_m$ )

$$v_m = \frac{vc \times (100\% - \text{Variasi fraksi volume serat})}{100\%}$$

$$= \frac{33,8 \text{ cm}^3 \times (100\% - 10\%)}{100\%}$$

$$v_m = 30,42 \text{ cm}^3$$

6. Massa matrik ( $m_m$ )

$$m_m = v_m \times \rho_m$$

$$= 30,42 \text{ cm}^3 \times 1,13 \text{ g/cm}^3$$

$$m_m = 34,37 \text{ g}$$

7. Massa katalis ( $m_k$ )

$$m_k = m_m \times 1\%$$

$$= 34,37 \text{ g} \times 1\%$$

$$= 0,34 \text{ g}$$

Selanjutnya untuk perhitungan variasi fraksi volume serat rencana sebesar 0%, 20%, 30% dan 40% dapat dilihat pada Lampiran 1 sedangkan untuk hasil perhitungan semua variasi fraksi volume serat dapat dilihat pada Tabel 3.1 dibawah ini.

Tabel 3.1. Perhitungan massa serat, massa matrik dan massa katalis

Fraksi volume serat batang pisang (%)	Massa serat batang pisang (g)	Massa matrik (g)	Massa Katalis (g)
0	0	38,19	0,38
10	2,07	34,37	0,34
20	4,14	30,56	0,31
30	6,21	26,74	0,27
40	8,27	22,92	0,23

2. Perhitungan variasi fraksi volume serat 0% dapat dilihat sebagai berikut :

1. Volume cetakan ( $v_c$ )

$$\begin{aligned}v_c &= p \times l \times t \\ &= 8 \text{ cm} \times 6,5 \text{ cm} \times 0,5 \text{ cm} \\ v_c &= 26 \text{ cm}^3\end{aligned}$$

2. Penambahan volume 30%

$$\begin{aligned}v_c &= v_c + (v_c \times 30\%) \\ &= 26 + (26 \times 30\%) \\ &= 33,8 \text{ cm}^3\end{aligned}$$

3. Volume serat ( $V_f$ )

$$\begin{aligned}V_f &= \frac{v_c \times \text{Variasi fraksi volume serat}}{100\%} \\ &= \frac{33,8 \text{ cm}^3 \times 0\%}{100\%} \\ V_f &= 0 \text{ cm}^3\end{aligned}$$

4. Massa serat ( $m_f$ )

$$\begin{aligned}m_f &= V_f \times \rho_f \\ &= 0 \text{ cm}^3 \times 0,612 \text{ g / cm}^3 \\ m_f &= 0 \text{ g}\end{aligned}$$

5. Volume matrik ( $v_m$ )

$$v_c \times (100\% - \text{Variasi fraksi volume serat})$$

7. Massa katalis ( $m_k$ )

$$\begin{aligned}m_k &= m_m \times 1\% \\ &= 38,19 \text{ g} \times 1\% \\ &= 0,38 \text{ g}\end{aligned}$$

3. Perhitungan variasi fraksi volume serat 20% dapat dilihat sebagai berikut :

1. Volume cetakan ( $v_c$ )

$$\begin{aligned}v_c &= p \times l \times t \\ &= 8 \text{ cm} \times 6,5 \text{ cm} \times 0,5 \text{ cm} \\ v_c &= 26 \text{ cm}^3\end{aligned}$$

2. Penambahan volume 30%

$$\begin{aligned}v_c &= v_c + (v_c \times 30\%) \\ &= 26 + (26 \times 30\%) \\ &= 33,8 \text{ cm}^3\end{aligned}$$

3. Volume serat ( $V_f$ )

$$\begin{aligned}V_f &= \frac{v_c \times \text{Variasi fraksi volume serat}}{100\%} \\ &= \frac{33,8 \text{ cm}^3 \times 20\%}{100\%} \\ V_f &= 6,76 \text{ cm}^3\end{aligned}$$

4. Massa serat ( $m_f$ )

$$\begin{aligned}m_f &= V_f \times \rho_f \\ &= 6,76 \text{ cm}^3 \times 0,612 \text{ g/cm}^3 \\ m_f &= 4,14 \text{ g}\end{aligned}$$

5. Volume matrik ( $v_m$ )

$$\begin{aligned}v_m &= \frac{v_c \times (100\% - \text{Variasi fraksi volume serat})}{100\%} \\ &= \frac{33,8 \text{ cm}^3 \times (100\% - 20\%)}{100\%} \\ &= 27,04 \text{ cm}^3\end{aligned}$$

6. Massa matrik ( $m_m$ )

$$\begin{aligned}
 m_m &= v_m \times \rho_m \\
 &= 27,04 \text{ cm}^3 \times 1,13 \text{ g/cm}^3 \\
 m_m &= 30,56 \text{ g}
 \end{aligned}$$

7. Massa katalis ( $m_k$ )

$$\begin{aligned}
 m_k &= m_m \times 1\% \\
 &= 30,56 \text{ g} \times 1\% \\
 &= 0,31 \text{ g}
 \end{aligned}$$

4. Perhitungan variasi fraksi volume serat 30% dapat dilihat sebagai berikut :

1. Volume cetakan ( $v_c$ )

$$\begin{aligned}
 v_c &= p \times l \times t \\
 &= 8 \text{ cm} \times 6,5 \text{ cm} \times 0,5 \text{ cm} \\
 v_c &= 26 \text{ cm}^3
 \end{aligned}$$

2. Penambahan volume 30%

$$\begin{aligned}
 v_c &= v_c + (v_c \times 30\%) \\
 &= 26 + (26 \times 30\%) \\
 &= 33,8 \text{ cm}^3
 \end{aligned}$$

3. Volume serat ( $V_f$ )

$$\begin{aligned}
 V_f &= \frac{v_c \times \text{Variasi fraksi volume serat}}{100\%} \\
 &= \frac{33,8 \text{ cm}^3 \times 30\%}{100\%} \\
 V_f &= 10,14 \text{ cm}^3
 \end{aligned}$$

4. Massa serat ( $m_f$ )

$$\begin{aligned}
 m_f &= V_f \times \rho_f \\
 &= 10,14 \text{ cm}^3 \times 0,612 \text{ g/cm}^3 \\
 m_f &= 6,21 \text{ g}
 \end{aligned}$$

5. Volume matrik ( $v_m$ )

$$\begin{aligned}
 v_m &= \frac{vc \times (100\% - \text{Variasi fraksi volume serat})}{100\%} \\
 &= \frac{33,8 \text{ cm}^3 \times (100\% - 30\%)}{100\%} \\
 &= 23,66 \text{ cm}^3
 \end{aligned}$$

6. Massa matrik ( $m_m$ )

$$\begin{aligned}
 m_m &= v_m \times \rho_m \\
 &= 23,66 \text{ cm}^3 \times 1,13 \text{ g/cm}^3 \\
 m_m &= 26,74 \text{ g}
 \end{aligned}$$

7. Massa katalis ( $m_k$ )

$$\begin{aligned}
 m_k &= m_m \times 1\% \\
 &= 26,74 \text{ g} \times 1\% \\
 &= 0,27 \text{ g}
 \end{aligned}$$

5. Berhitungnya variasi fraksi volume serat 100% dapat dilihat sebagai berikut :

$$\begin{aligned}m_f &= V_f \times \rho_f \\ &= 13,52 \text{ cm}^3 \times 0,612 \text{ g/cm}^3 \\ m_f &= 8,27 \text{ g}\end{aligned}$$

5. Volume matrik ( $v_m$ )

$$\begin{aligned}v_m &= \frac{vc \times (100\% - \text{Variasi fraksi volume serat})}{100\%} \\ &= \frac{33,8 \text{ cm}^3 \times (100\% - 40\%)}{100\%}\end{aligned}$$

$$v_m = 20,28 \text{ cm}^3$$

6. Massa matrik ( $m_m$ )

$$\begin{aligned}m_m &= v_m \times \rho_m \\ &= 20,28 \text{ cm}^3 \times 1,13 \text{ g/cm}^3 \\ m_m &= 22,92 \text{ g}\end{aligned}$$

7. Massa katalis ( $m_k$ )

$$\begin{aligned}m_k &= m_m \times 1\% \\ &= 22,92 \text{ g} \times 1\% \\ &= 0,23 \text{ g}\end{aligned}$$